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Hanford 1964 Atmospheric Boundary Layer Experiment: Micrometeorological and Tracer Data Archive Set 002 Documentation Report

Battelle Pacific Northwest Labs., Richland, WA

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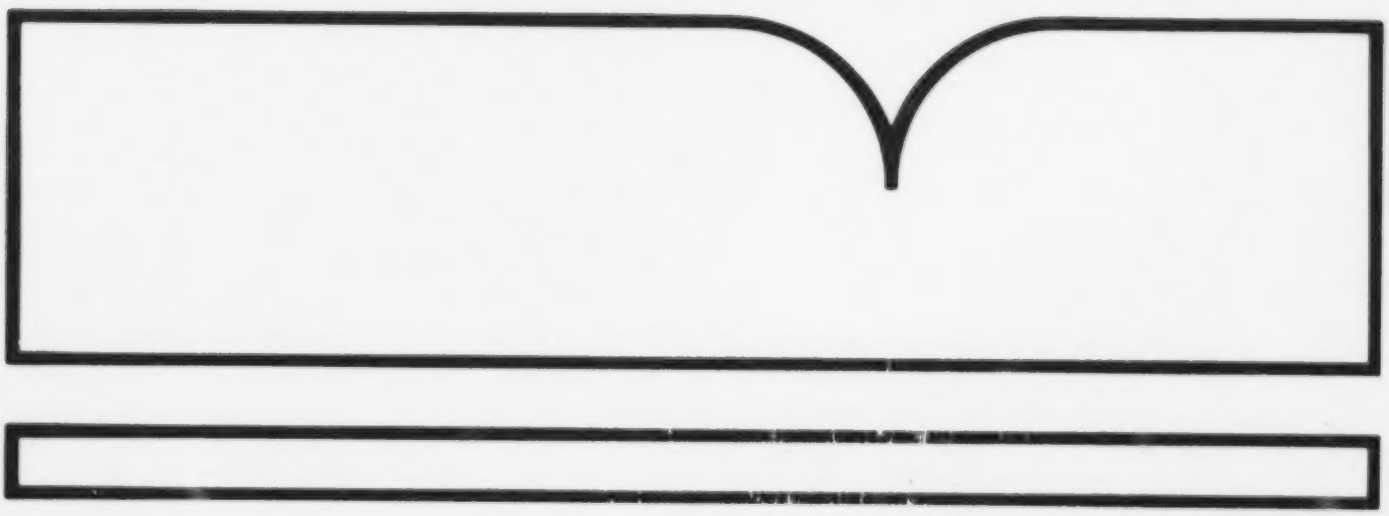

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THE HANFORD 1964 ATMOSPHERIC BOUNDARY LAYER EXPERIMENT
Micrometeorological and Tracer Data Archive
Set 002 Documentation Report

by

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Contract Number 68-02-4063

Project Officer

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An archive for micrometeorological and tracer dispersion data has been developed by Battelle, Pacific Northwest Laboratories for the U.S. Environmental Protection Agency. The archive is designed to make the results of extensive field tests readily accessible to EPA for model testing, development, and verification efforts.

This report provides documentation for one of the archived data sets, the Hanford 1964 Atmospheric Dispersion Experiment. The aim of this effort is to archive invaluable data sets in a timely fashion before the necessary supporting information about the data becomes lost forever.

The entries in this documentation report are as follows: data set fact summary, a narrative description of experiment and data, special information, references, a description of archive data files, contacts (names, addresses, and phone numbers) and standard experiment summary table.

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The authors wish to acknowledge the foresight of the U.S. Environmental Protection Agency's Atmospheric Sciences Research Laboratory in initiating a project with the intent of preserving valuable data bases in a form readily available to the technical community. John S. Irwin's contribution in conceiving and guiding the effort as Project Officer is gratefully acknowledged.

SECTION 1

INTRODUCTION

The Meteorology and Assessment Division of the U.S. Environmental Protection Agency's (EPA's) Atmospheric Sciences Research Laboratory has initiated a project to develop and establish an archive of original experimental data and documentation for use by atmospheric dispersion and boundary layer researchers. The archive of data sets will be useful for evaluating and improving dispersion models, ensuring the retention of these data for the future, and making them more readily available to the research community.

This report documents the micrometeorological and tracer (M&T) data archive for the Hanford 1964 Atmospheric Dispersion Experiment. The next section provides listings of the data set documentation entries. This information is also provided in ASCII files on the data archive tape.

The archive includes both documentation and data. A data set documentation report is prepared for each archived data set.

The archive is contained in five or more files on magnetic tape and these consist of a header file, three documentation files, and one or more data files.

The data are entered into the archive in as close to original form as possible to maintain a clear link with original records. The archived data are contained within a well-defined structure called a data map. The data map allows data to be entered in original formats, while providing the user with a machine-readable pathway for accessing the diverse data formats.

Detailed information that the user will find useful, if not essential, is contained in the data archive introduction report, Introduction to Micrometeorological and Tracer Data Archive Procedures (Droppo and Watson, 1985). That report provides an overview of the archive and specific guidance for using it. In addition, it provides a brief summary of all the data sets in the archive.

Questions about the archive not answered by this report or the data introduction report (Droppo and Watson, 1985) should be directed to:

U.S. Environmental Protection Agency
Atmospheric Sciences Research LAboratory
Meteorology Assessment Division
Research Triangle Park, North Carolina 27711

SECTION 2

DATA SET DOCUMENTATION ENTRIES

The data set documentation entries for the Hanford 1964 Atmospheric Dispersion Experiment are given below.

DATA SET FACT SUMMARY

Archive Set Title: M&T DATA ARCHIVE 002

Experiment Type: Atmospheric dispersion, tracer, planetary boundary layer

Name: Hanford 1964, or Hanford S Series

Purpose: To examine the dispersion of a particulate tracer under stable atmospheric conditions

Location: Southeastern Washington state, on the U.S. Government's Hanford Reservation

Time: Spring and summer, 1964

Number of Tests: 15; the results of 14 are published

Nature of Experiment: Tracer dispersion experiments conducted over relatively flat terrain. The tracer (ZnS) was released from a location on a 121.9-m (400-ft) tower and sampled on a number of arcs arrayed between 200 m and 12,800 m from the release tower. Sampling was conducted at approximately ground level (1.5 m above ground level) and on as many as 20 sampling towers.

Meteorological Conditions: Nighttime tracer releases with generally stable atmospheric stabilities.

Meteorological Measurements: Wind speed and direction, the standard deviation of the wind direction, and temperature were all measured at eight levels on a 121.9-m (400 ft) tower. Similar measurements at six levels on an 24.4-m (80 ft) portable mast were made during three of the experiments.

Measurement Methods: Filter samplers were deployed on the arcs at 1.5 m above ground level and on sampling towers at various heights.

NARRATIVE DESCRIPTION OF EXPERIMENT AND DATA

Site

The Hanford 1964 experiments were conducted on what is now the U.S. Department of Energy's Hanford site. Hanford is located in a 40-km-wide basin in southeastern Washington state (latitude 46°34'N, longitude 119°36'W, elevation 733 feet). The site is bordered on the north and east by the Columbia River, and on the west and south by the Rattlesnake Hills and the Yakima River. The climate of the region is semiarid. The experiments were conducted on the relatively flat Hanford Dispersion Grid at an elevation of roughly 200 m above sea level. The vegetation on the grid is composed primarily of steppe grasses and sagebrush. A typical roughness length for the area is 3 cm.

Measurements

The tracer used in the Hanford 1964 experiments was zinc sulfide (ZnS), a fluorescent pigment. The tracer was dispersed through a commercially available insecticide sprayer. Releases were made from the 56-m level of the meteorological tower in eleven of the reported experiments and from the 111-m level in three other experiments. Release duration ranged from 20 to 72 minutes.

The sampling arcs used during the Hanford 1964 experiments were located 200, 800, 1600, 3200, 7000, and 12,800 m from the release tower; however, only four arcs were used in any one experiment. Ground-level sampling was conducted on each of the arcs at 1.5 m above ground level. The four interior arcs each had an angular extent of approximately 90 degrees around the release tower; ground-level samplers were spaced at two-degree intervals on the 200- and 800-m arcs and at one-degree intervals on the 1600- and 3200-m arcs. The 7000-m arc covered roughly 45 degrees, with samplers spaced at four-degree intervals. The 12,800-m arc also covered roughly 45 degrees; its samplers were spaced at one-degree intervals. Five towers, with 15 samplers per tower, were available for use on each of the 200-, 800-, 1600-, and 3200-m arcs. The maximum sampling heights on the towers were 27 m on the 200 m arc, 40 m on the 800 m arc, and 62 m on the 1600- and 3200-m arcs.

Meteorological data were provided by instruments deployed on a 121.9-m (400-ft) tower. Measurements of temperature, wind speed, wind direction, and the standard deviation of the wind direction were made at the 2.1-, 15.2-, 0.5-, 45.7-, 60.9-, 76.2-, 91.4-, and 121.9-m (7-, 50-, 100-, 150-, 200-, 250-, 300-, and 400-ft) levels on the tower. An 80-ft portable meteorological mast was deployed near the 121.9 m (400-ft) tower during three of the experiments in order to provide supplementary, low-level data. Measurements were made at the 0.76-, 1.52-, 3.05-, 8.8-, 12.1-, and 24.4-m (2.5-, 5-, 10-, 20-, 40-, and 80-ft) levels on the mast.

NARRATIVE DESCRIPTION OF EXPERIMENT AND DATA (cont.)

Analysis

Tracer sampling was conducted on GM-1 filters. These filters are 47 mm in diameter and offer a compromise between the opposing requirements of minimal restriction to flow through the filter and a relatively hard, flat surface upon which the ZnS can be retained. The filter was inserted into a polyethylene filter holder assembly that left a 41-mm-diameter circular area exposed for tracer collection. Samples were collected on the filter by drawing air through the filter assembly using vacuum pumps. The flow through each filter was controlled by a critical-flow orifice in the vacuum line. Filters were assayed in the laboratory using a Rankin counter.

Data

Fifteen tracer releases were conducted during the Hanford 1964 experiments. The results of fourteen of these runs were published in Nickola et al., 1983; the unpublished run was characterized as unsuccessful because of a wind shift that occurred shortly after the beginning of the experiment, resulting in the transport of the tracer off the sampling grid. The data from all fifteen experiments are currently on computer tape at Battelle, Pacific Northwest Laboratories.

SPECIAL INFORMATION

The Hanford 1964 experiments were a follow-up to the previous year's Hanford 1963 experiments. Both the 1963 and 1964 series were conducted to provide information before the emphasis of the Hanford U series experiments was changed from neutral and unstable atmospheric conditions to stable atmospheric conditions. The equipment and techniques used in the Hanford 1964 series are similar to those used in other experiments conducted on the Hanford Dispersion Grid. For further information on these experiments, see Nickola (1977), Barad and Fuquay (1962a and 1962b), Nickola, Ramsdell and Ludwick (1970), Hinds (1967 and 1969), and Nickola et al. (1983).

The question of tracer deposition in the early Hanford data was considered by Simpson (1961) and discussed by Irwin (1983). The tracer release methods were improved over the course of the Hanford studies, and the question of tracer deposition should be treated on a study by study basis.

DOCUMENTATION - Hanford 1964

Nickola, P. W., J. V. Ramsdell, C. S. Glantz and R. E. Kerns. Hanford Atmospheric Dispersion Data: 1960 Through June 1967. NUREG/CR-3456, PNL-4814, U.S. Nuclear Regulatory Commission, Washington, D.C., 1983. [Contains Hanford 1964 data.]

Other documents of interest:

Barad, M. L., and J. J. Fuquay (Eds.). The Green Glow Diffusion Program. Geophysical Research Papers No. 73, Vol. I, AFCRL-62-251 (I), Air Force Cambridge Research Laboratories, Bedford, Massachusetts, 1962a.

Barad, M. L., and J. J. Fuquay (Eds.). The Green Glow Diffusion Program. Geophysical Research Papers No. 73, Vol. II, AFCRL-62-251 (II), Air Force Cambridge Research Laboratories, Bedford, Massachusetts, 1962b.

Hinds, W. T. On The Variance of Concentration in Plumes And Wakes. BNWL-SA-1435, Pacific Northwest Laboratory, Richland, Washington, 1967.

Hinds, W. T. Peak-to-Mean Concentration Ratios from Ground Level Sources in Building Wakes. Atmos. Environ., 3:145-156, 1969.

Irwin, J. G. Estimating Run Dispersion - A Comparison of Sigma Schemes. J. of Climate and Appl. Meteor., 22:92-114, 1983.

Nickola, P. W. The Hanford 67-Series: A Volume of Atmospheric Diffusion Measurements. PNL-2433, Pacific Northwest Laboratory, Richland, Washington, 1977.

Nickola, P. W., J. V. Ramsdell, and J. D. Ludwick. Detailed Time-Histories of Concentrations Resulting from Puff and Short-Period Releases of an Inert Radioactive Gas: A Volume of Atmospheric Diffusion Data. BNWL-1272, Pacific Northwest Laboratory, Richland, Washington, 1970.

Ramsdell, J. V., C. S. Glantz, and R. E. Kerns. Hanford Atmospheric Dispersion Data: 1959-1974. Atmos. Environ., 19:83-86, 1985.

Simpson, C. L. Some Measurements of Deposition of Matter and its Relation to Diffusion from a Continuous Point Source in a Stable Atmosphere. Hanford Atomic, Products Operation, HW-69292-REV-26PPE [Available from the National Technical Information Service, Springfield, Virginia], 1961.

Stone, W. A., and J. M. Thorp, O. P. Gifford and D. J. Hoitink. Climatology Summary for the Hanford Area. PNL-4622, Pacific Northwest Laboratory, Richland, Washington, 1983.

FILE DESCRIPTION

Overview

The archived Hanford 1964 data are in one file with three subsets data of taken from published results. The results were reported in numerous tables with the same format, so that the data map in a subset can be used to define the contents and location of data in many tables. A data variables listing, data subset summary, data subset variables listings, and the data file characteristics are summarized in tabular form below.

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2

NAME	\UNITS	\RECORD	\DEFINITION
ANGLEKURT	\NO UNITS	\0198	\CROSSWIND DISTRIBUTION: KURTOSIS
ANGLEMEAN	\DEG	\0192	\CROSSWIND DISTRIBUTION: MEAN ANGLE
ANGLESKEW	\NO UNITS	\0196	\CROSSWIND DISTRIBUTION: COEFFICIENT OF SKEWNESS
ANGLESTD	\DEG	\0194	\CROSSWIND DISTRIBUTION: STANDARD DEVIATION ABOUT THE MEAN
AZM2ND	\DEG	\0211	\POSITION OF 2ND MAXIMUM EXPOSURE ON ARC
AZM3RD	\DEG	\0218	\POSITION OF 3RD MAXIMUM EXPOSURE ON ARC
AZMANG	\DEG	\0140	\AZIMUTH DEG
AZMANG	\DEG	\0160	\AZIMUTH DEG
AZMMAX	\DEG	\0200	\AZIMUTH, POSITION OF MAXIMUM EXPOSURE ON ARC
CONCCWIUQ	\1/M.	\0208	\CROSSWIND INTEGRATED EU/Q
CONCQ	\S/CU.M	\0142	\E/Q SEC/CU.M
CONCQ	\S/CU.M	\0163	\E/Q SEC/CU.M
CONCQ2ND	\S/CU.M	\0213	\2ND MAXIMUM E/Q ON ARC
CONCQ3RD	\S/CU.M	\0220	\3RD MAXIMUM E/Q ON ARC
CONCQ4	\S/CU.M	\0147	\E/Q SEC/SQ.M
CONCQMAX	\S/CU.M	\0202	\MAXIMUM E/Q ON ARC
CONCUQ	\1/SQ.M	\0143	\EU/Q 1/SQ.M
CONCUQ	\1/SQ.M	\0164	\EU/Q 1/SQ.M
CONCUQ2ND	\1/SQ.M	\0215	\2ND MAXIMUM EU/Q ON ARC
CONCUQ3RD	\1/SQ.M	\0222	\3RD MAXIMUM EU/Q ON ARC
CONCUQ4	\1/SQ.M	\0148	\EU/Q 1/SQ.M
CONCUQMAX	\1/SQ.M	\0204	\MAXIMUM EU/Q ON ARC
CONCWIQ	\S/SQ.M	\0206	\CROSSWIND INTEGRATED E/Q
DAY	\NO UNITS	\0121	\day of month
DAY	\NO UNITS	\0172	\day
DIRECT5	\DEG	\4972	\wind direction on mast

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 (cont.)

NAME	\ UNITS	\RECORD	\DEFINITION
DIST	\M	\0130	\M ARC
DIST	\M	\0144	\DISTANCE METERS
DIST	\M	\0152	\M ARC
DIST	\M	\0165	\DISTANCE METERS
DIST	\M	\0191	\ARC'S DISTANCE FROM SOURCE
DISTINNER	\M	\0087	\Sampling Distance from Source,m - Nearest arc
DISTOUTER	\M	\0088	\Sampling Distance from Source,m - Farthest arc
DURATION	\MIN	\0086	\Duration of Release
ELEV	\M	\0128	\elevation M
ELEV	\M	\0179	\elevation M
EXPOSURE	\G*S/CU.M	\0141	\EXPOSURE GM-SEC/CU.M X 10E+6
EXPOSURE	\G*S/CU.M	\0162	\EXPOSURE GM-SEC/CU.M X 10E+6
FLAG	\NO UNITS	\0193	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0195	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0197	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0199	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0201	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0203	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0205	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0207	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0209	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0212	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0214	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0216	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0219	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0221	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
FLAG	\NO UNITS	\0223	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
GRIDSOURC	\NO UNITS	\0080	\Grid Source (U = unstable grid, S = stable grid)
HGT	\M	\0161	\HEIGHT METERS

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 (cont.)

NAME	\ UNITS	\RECORD	\DEFINITION
HGT1	\M	\0136	\AT M
HGT2	\M	\0156	\AT M
HGT3	\M	\0188	\AT M
HGT4	\FT	\4954	\height above ground
HGT4	\FT	\4965	\height above ground
HGT5	\FT	\4959	\height above ground on mast
HGT5	\FT	\4970	\height above ground on mast
HGTRELEAS	\M	\0084	\Release Height (m)
HGTSAMPLE	\M	\0132	\SAMPLER HT M
HGTSAMPLE	\M	\0183	\SAMPLER HT M
MONTH	\NO UNITS	\0120	\Month
MONTH	\NO UNITS	\0171	\Month
NOTE	\NO UNITS	\0082	\Asterisk indicates speed at 2.0 meters
QTOTAL	\G	\0090	\grams of tracer released
REMARK	\SET	\0139	\none
REMARK	\SET	\0159	\none
RUN	\NO UNITS	\0079	\Experiment run number in S series
RUN	\NO UNITS	\0119	\Test
RUN	\NO UNITS	\0170	\Test
RUN	\NO UNITS	\4953	\run identifier
STABILTY	\NO UNITS	\0083	\Richardson number-- Ri sub b
TEMP4	\DEG F	\4958	\temperature in degrees F
TEMP4	\DEG F	\4969	\temperature in degrees F
TEMP5	\DEG F	\4963	\temperature in degrees F on mast
TEMP5	\DEG F	\4974	\temperature in degrees F on mast
TEXT	\NO UNITS	\0118	\"TEST "
TEXT	\NO UNITS	\0127	\"ZINC SULFIDE RELEASE FROM ELEVATION OF"
TEXT	\NO UNITS	\0131	\"M ARC SAMPLER HT"
TEXT	\NO UNITS	\0133	\"M U="
TEXT	\NO UNITS	\0135	\" M/SEC AT"
TEXT	\NO UNITS	\0137	\"M"
TEXT	\NO UNITS	\0146	\"CROSSWIND INTEGRATED="
TEXT	\NO UNITS	\0153	\"M ARC U="
TEXT	\NO UNITS	\0155	\" M/SEC AT"
TEXT	\NO UNITS	\0157	\"M"
TEXT	\NO UNITS	\0169	\"TEST "
TEXT	\NO UNITS	\0178	\" ZINC SULFIDE RELEASE FROM ELEVATION OF"
TEXT	\NO UNITS	\0180	\"M"
TEXT	\NO UNITS	\0182	\"SAMPLER HT"
TEXT	\NO UNITS	\0184	\"M"
TEXT	\NO UNITS	\0185	\"U="
TEXT	\NO UNITS	\0187	\"M/SEC AT"
TEXT	\NO UNITS	\0189	\"M"
TIMESTART	\HHMM	\0123	\tracer release -- start time
TIMESTART	\HHMM	\0174	\Tracer release -- start time

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 (cont.)

NAME	\ UNITS	\RECORD	\DEFINITION
TIMESTOP	\HHMM	\0124	\tracer release -- end time
TIMESTOP	\HHMM	\0175	\Tracer release -- end time
TIMEZONE	\NO UNITS	\0125	\time zone
TIMEZONE	\NO UNITS	\0176	\time zone
TOWERNUM	\NO UNITS	\0089	\Total number of Towers Active
TRACER	\NO UNITS	\0085	\Type of Tracer
UDIR4	\DEG	\4956	\wind direction
UDIR4	\DEG	\4967	\wind direction
UDIR5	\DEG	\4961	\wind direction on mast
USIGT4	\DEG	\4957	\standard deviation of wind direction
USIGT4	\DEG	\4968	\standard deviation of wind direction
USIGT5	\DEG	\4962	\standard deviation of wind direction on mast
USIGT5	\DEG	\4973	\Standard deviation of wind direction on mast
USPEED	\M/S	\0081	\Wind speed (m/s), measured at 1.5m (2.0m if asterisk in next
USPEED1	\M/S	\0134	\U M/SEC
USPEED2	\M/S	\0154	\U M/SEC
USPEED3	\M/S	\0186	\U M/SEC
USPEED4	\M/S	\4955	\wind speed
USPEED4	\M/S	\4966	\wind speed
USPEED5	\M/S	\4960	\wind speed on mast
USPEED5	\M/S	\4971	\wind speed on mast
YEAR	\NO UNITS	\0122	\YEAR
YEAR	\NO UNITS	\0173	\YEAR

SUBSET SUMMARY FOR M&T DATA ARCHIVE SET 2

SUBSET NUMBER	TITLE
0001	Hanford 1964 S series Table 3 page 25-27 GROUP TITLE\ General Grid, Source, Release and Meteorological Information
0002	Hanford 1964 S series Appendix A and B GROUP TITLE\Tracer measurement on surface arcs and towers GROUP TITLE\VERTICAL DEPOSITION PROFILE GROUP TITLE\DIFFUSION SUMMARIES
0003	Hanford 1964 S series Appendix C GROUP TITLE\Meteorological data

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 - SUBSET 1

NAME	\ UNITS	\RECORD	\DEFINITION
RUN	\NO UNITS	\0079	\Experiment run number in S series
GRIDSOURC	\NO UNITS	\0080	\Grid Source (U = unstable grid, S = stable grid)
USPEED	\M/S	\0081	\Wind speed (m/s), measured at 1.5m (2.0m if asterisk in next
NOTE	\NO UNITS	\0082	\Asterisk indicates speed at 2.0 meters
STABILTY	\NO UNITS	\0083	\Richardson number-- Ri sub b
HGTRELEAS	\M	\0084	\Release Height (m)
TRACER	\NO UNITS	\0085	\Type of Tracer
DURATION	\MIN	\0086	\Duration of Release
DISTINNER	\M	\0087	\Sampling Distance from Source,m - Nearest arc
DISTOUTER	\M	\0088	\Sampling Distance from Source,m - Farthest arc
TOWERNUM	\NO UNITS	\0089	\Total number of Towers Active
QTOTAL	\G	\0090	\grams of tracer released

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 - SUBSET 2

NAME	\ UNITS	\RECORD	\DEFINITION
TEXT	\NO UNITS	\0118	\"TEST "
RUN	\NO UNITS	\0119	\Test
MONTH	\NO UNITS	\0120	\Month
DAY	\NO UNITS	\0121	\day of month
YEAR	\NO UNITS	\0122	\YEAR
TIMESTART	\HHMM	\0123	\tracer release -- start time
TIMESTOP	\HHMM	\0124	\tracer release -- end time
TIMEZONE	\NO UNITS	\0125	\time zone
TEXT	\NO UNITS	\0127	\"ZINC SULFIDE RELEASE FROM ELEVATION OF"
ELEV	\M	\0128	\elevation M
DIST	\M	\0130	\M ARC
TEXT	\NO UNITS	\0131	\"M ARC SAMPLER HT"
HGTSAMPLE	\M	\0132	\SAMPLER HT M
TEXT	\NO UNITS	\0133	\"M U="
USPEED1	\M/S	\0134	\U M/SEC
TEXT	\NO UNITS	\0135	\" M/SEC AT"
HGT1	\M	\0136	\AT M
TEXT	\NO UNITS	\0137	\"M"
REMARK	\SET	\0139	\none
AZMANG	\DEG	\0140	\AZIMUTH DEG
EXPOSURE	\G*S/CU.M	\0141	\EXPOSURE GM-SEC/CU.M X 10E+6
CONCQ	\S/CU.M	\0142	\E/Q SEC/CU.M
CONCUQ	\1/SQ.M	\0143	\EU/Q 1/SQ.M
DIST	\M	\0144	\DISTANCE METERS
TEXT	\NO UNITS	\0146	\"CROSSWIND INTEGRATED="
CONCQ4	\S/CU.M	\0147	\E/Q SEC/SQ.M
CONCUQ4	\1/SQ.M	\0148	\EU/Q 1/SQ.M
DIST	\M	\0152	\M ARC
TEXT	\NO UNITS	\0153	\"M ARC U="
USPEED2	\M/S	\0154	\U M/SEC
TEXT	\NO UNITS	\0155	\" M/SEC AT"
HGT2	\M	\0156	\AT M
TEXT	\NO UNITS	\0157	\"M"
REMARK	\SET	\0159	\none
AZMANG	\DEG	\0160	\AZIMUTH DEG
HGT	\M	\0161	\HEIGHT METERS
EXPOSURE	\G*S/CU.M	\0162	\EXPOSURE GM-SEC/CU.M X 10E+6
CONCQ	\S/CU.M	\0163	\E/Q SEC/CU.M
CONCUQ	\1/SQ.M	\0164	\EU/Q 1/SQ.M
DIST	\M	\0165	\DISTANCE METERS
TEXT	\NO UNITS	\0169	\"TEST "
RUN	\NO UNITS	\0170	\Test
MONTH	\NO UNITS	\0171	\Month
DAY	\NO UNITS	\0172	\day
YEAR	\NO UNITS	\0173	\YEAR

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 - SUBSET 2

NAME	\ UNITS	\RECORD	\DEFINITION
TIMESTART	\HHMM	\0174	\Tracer release -- start time
TIMESTOP	\HHMM	\0175	\Tracer release -- end time
TIMEZONE	\NO UNITS	\0176	\time zone
TEXT	\NO UNITS	\0178	\" ZINC SULFIDE RELEASE FROM ELEVATION OF"
ELEV	\M	\0179	\elevation M
TEXT	\NO UNITS	\0180	\"M"
TEXT	\NO UNITS	\0182	\"SAMPLER HT"
HGTSAMPLE	\M	\0183	\SAMPLER HT M
TEXT	\NO UNITS	\0184	\"M"
TEXT	\NO UNITS	\0185	\"U="
USPEED3	\M/S	\0186	\U M/SEC
TEXT	\NO UNITS	\0187	\"M/SEC AT"
HGT3	\M	\0188	\AT M
TEXT	\NO UNITS	\0189	\"M"
DIST	\M	\0191	\ARC'S DISTANCE FROM SOURCE
ANGLEMEAN	\DEG	\0192	\CROSSWIND DISTRIBUTION: MEAN ANGLE
FLAG	\NO UNITS	\0193	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
ANGLESTD	\DEG	\0194	\CROSSWIND DISTRIBUTION: STANDARD DEVIATION ABOUT THE MEAN
FLAG	\NO UNITS	\0195	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
ANGLESKEW	\NO UNITS	\0196	\CROSSWIND DISTRIBUTION: COEFFICIENT OF SKEWNESS
FLAG	\NO UNITS	\0197	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
ANGLEKURT	\NO UNITS	\0198	\CROSSWIND DISTRIBUTION: KURTOSIS
FLAG	\NO UNITS	\0199	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
AZMMAX	\DEG	\0200	\AZIMUTH, POSITION OF MAXIMUM EXPOSURE ON ARC
FLAG	\NO UNITS	\0201	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCQMAX	\S/CU.M	\0202	\MAXIMUM E/Q ON ARC
FLAG	\NO UNITS	\0203	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCUQMAX	\1/SQ.M	\0204	\MAXIMUM EU/Q ON ARC
FLAG	\NO UNITS	\0205	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCWIQ	\S/SQ.M	\0206	\CROSSWIND INTEGRATED E/Q
FLAG	\NO UNITS	\0207	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCCWIUQ	\1/M.	\0208	\CROSSWIND INTEGRATED EU/Q
FLAG	\NO UNITS	\0209	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
AZM2ND	\DEG	\0211	\POSITION OF 2ND MAXIMUM EXPOSURE ON ARC

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 - SUBSET 2

NAME	\ UNITS	\RECORD	\DEFINITION
FLAG	\NO UNITS	\0212	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCQ2ND	\S/CU.M	\0213	\2ND MAXIMUM E/Q ON ARC
FLAG	\NO UNITS	\0214	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCUQ2ND	\1/SQ.M	\0215	\2ND MAXIMUM EU/Q ON ARC
FLAG	\NO UNITS	\0216	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
AZM3RD	\DEG	\0218	\POSITION OF 3RD MAXIMUM EXPOSURE ON ARC
FLAG	\NO UNITS	\0219	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCQ3RD	\S/CU.M	\0220	\3RD MAXIMUM E/Q ON ARC
FLAG	\NO UNITS	\0221	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE
CONCUQ3RD	\1/SQ.M	\0222	\3RD MAXIMUM EU/Q ON ARC
FLAG	\NO UNITS	\0223	\PROBLEM FLAG?=UNCERTAINTY,X=INVALID OR INCOMPLETE

FILE DESCRIPTION - Hanford 1964 (cont.)

DATA VARIABLES LISTING FOR M&T DATA ARCHIVE SET 2 - SUBSET 3

NAME	\ UNITS	\RECORD	\DEFINITION
RUN	\NO UNITS	\4953	\run identifier
HGT4	\FT	\4954	\height above ground
USPEED4	\M/S	\4955	\wind speed
UDIR4	\DEG	\4956	\wind direction
USIGT4	\DEG	\4957	\standard deviation of wind direction
TEMP4	\DEG F	\4958	\temperature in degrees F
HGT5	\FT	\4959	\height above ground on mast
USPEED5	\M/S	\4960	\wind speed on mast
UDIR5	\DEG	\4961	\wind direction on mast
USIGT5	\DEG	\4962	\standard deviation of wind direction on mast
TEMP5	\DEG F	\4963	\temperature in degrees F on mast
HGT4	\FT	\4965	\height above ground
USPEED4	\M/S	\4966	\wind speed
UDIR4	\DEG	\4967	\wind direction
USIGT4	\DEG	\4968	\standard deviation of wind direction
TEMP4	\DEG F	\4969	\temperature in degrees F
HGT5	\FT	\4970	\height above ground on mast
USPEED5	\M/S	\4971	\wind speed on mast
DIRECT5	\DEG	\4972	\wind direction on mast
USIGT5	\DEG	\4973	\Standard deviation of wind direction on mast
TEMP5	\DEG F	\4974	\temperature in degrees F on mast

FILE PARAMETERS FOR M&T DATA ARCHIVE SET 2, REVISION 1

TAPE FILE NUMBER	NUMBER OF CHARACTERS	NUMBER OF LINES	ODD ASCII CHECKSUM	EVEN ASCII CHECKSUM
0006	31794	5108	27097	60695

REVISION LOG FOR M&T DATA ARCHIVE SET 2

ARCHIVE NUMBER	REVISION NUMBER	DATE	NOTES
002	000	12-26-84	Draft Data Archive
002	001	6- 5-85	Revised Data Archive

CONTACTS - Hanford 1964

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STANDARD EXPERIMENT SUMMARY

Following is a listing of values of variables of common interest in studies of this type that may be used to determine the relative utility of the subject data set or individual runs with in the data set. This list does not represent all the variables in the Hanford 1964 data set. The full nature of the data set is outlined above and is defined precisely in the data map.

The definitions of each of the variables are found below.

NUM	RUN	DUR	HGT	TCR	STB	XMI	XMA	SGY	SGZ	SRT	ELT	INT	RMT	VST	ART	MTM	TRB	SFM	ELM	ARM	RMM
2	1	38	56	P	NS	0.2	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	2	26	56	P	NS	0.2	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	4	26	56	P	NS	0.2	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	5	32	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	6	20	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	7	30	56	P	NS	0.2	3.2	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	8	60	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	9	60	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	10	60	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	11	21	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	12	57	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	13	72	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	14	42	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N
2	15	46	56	P	NS	1.6	12.8	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N

NUM = M&T DATA ARCHIVE SET NUMBER
RUN = ARCHIVED DATA RUN NUMBER
DUR = TRACER RELEASE DURATION (MIN)
HGT = TRACER RELEASE HEIGHT (M)
TCR = TYPE OF TRACER USED (S=SMOKE G=GAS P=PARTICLE)
STB = ATMOS. STABILITY FOR SET (S=STAB U=UNST N=NEUT)
XMI = MINIMUM SAMPLING DISTANCE FROM SOURCE (KM)
XMA = MAXIMUM SAMPLING DISTANCE FROM SOURCE (KM)
SGY = ESTIMATES OF SIGMA Y -- Y=YES N=NO
SGZ = ESTIMATES OF SIGMA Z -- Y=YES N=NO
SRT = SURFACE MEASUREMENTS OF THE TRACER - Y OR N
ELT = ELEVATED OR TOWER MEASUREMENTS OF TRACER - Y OR N
INT = INSITU TRACER MEASUREMENT - Y OR N
RMT = REMOTE SENSING OF TRACER - Y OR N
VST = VISUAL TRACER MEASUREMENT - Y OR N
ART = AIRCRAFT TRACER MEASUREMENT - Y OR N
MTM = MEAN METEOROLOGICAL VALUES FOR EXPERIMENT - Y OR N
TRB = TURBULENCE MEASUREMENTS - Y OR N
SFM = SURFACE METEOROLOGICAL MEASUREMENTS - Y OR N
ELM = ELEVATED OR TOWER METEOR. MEASUREMENTS - Y OR N
ARM = AIRCRAFT METEOROLOGICAL MEAUREMENTS - Y OR N
RMM = REMOTE SENSING OF METEOROLOGY - Y OR N

REFERENCE

Droppo, J. G., and C. R. Watson. Introduction to Micrometeorological and Tracer Data Archive Procedures, EPA-600/3-85/052, 1985.